IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appellant:	Mark A. Lillis	)
		) Group Art Unit: 1745
Serial No.:	10/065,373	)
		)
Filed:	October 10, 2002	) Examiner: M. Ruthkosky
		)
For:	CALIBRATION PROCESS AND APPARATUS FOR AN ELECTROCHEMICAL CELL SYSTEM	)

VIA ELECTRONIC FILING
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

APPEAL BRIEF

I. REAL PARTY IN INTEREST

The real party in interest in this appeal is Proton Energy Systems, Inc.

II. RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences known to Appellants, Appellants' legal representatives, or assignee that will directly affect, be directly affected by, or have a bearing on the Board's decision in the pending appeal.

III. STATUS OF THE CLAIMS

Claims 1 – 32 have been filed in the present application. Claims 11 – 16 and 21 – 32 are currently pending, while Claims 1 – 10 and 17 – 20 are cancelled. Claims 11 – 16 and 21 – 32 stand finally rejected. Claims 11 – 16 and 21 – 32, as they currently stand, are set forth in Section VIII. Claims Appendix. Appellants hereby appeal the final rejection of Claims 11 – 16 and 21 – 32.

IV. STATUS OF THE AMENDMENTS

No amendments have been filed subsequent to the final rejection dated May 18, 2006. All prior amendments have been entered.

V. SUMMARY OF CLAIMED SUBJECT MATTER

Electrochemical cells are energy conversion devices that, for example, generates hydrogen by the electrolytic decomposition of water to produce hydrogen and oxygen gases. Detectors are used to monitor electrochemical cell systems to detect for hydrogen leaks. Over time, these detectors drift, losing sensitivity and accuracy, and needing recalibration. It is desirable to have a means to determine whether the output signal from the hydrogen detector is a valid measure of the gas concentration. (Paragraphs [0001] and [0002])

Hence, recalibration of the hydrogen gas detectors is periodically required to ensure accurate readings and safe operating conditions. Presently, calibration is performed manually, e.g., by an operator physically spraying control mixtures of air and hydrogen gases directly onto the detector. The operator then manually calibrates the detector to ensure accurate readings during operation of the system. This manual calibration requires an operator to physically make

the necessary detector adjustments. Many locations where gas detection instruments are installed are inaccessible. As such, certain operator skill and time are required to accurately and precisely calibrate the system. Furthermore, even if periodic manual calibration of the detector is performed, the detector may still fail during the time interval between calibrations, and this failure will result in false gas concentration readings, or failure to respond when exposed to the hydrogen gas. (Paragraph [0002])

The problem of calibration and manual intervention has been resolved by the process disclosed and claimed in the present application. Advantageously, use of the hydrogen gas detecting device and calibration method disclosed therein, e.g., the use of hydrogen-free gas, such as air, and hydrogen gas at or about ambient pressure eliminates the need for expensive pressure regulators or controls and simplifies the hydrogen gas monitoring process. Moreover, the need for an operator to manually and periodically calibrate a hydrogen gas detector is eliminated. (Paragraph [0031])

Claim 11 is directed to a process for operating an electrochemical system. The process comprises: calibrating a hydrogen gas detector (Supported at least in Paragraphs [0005], [0025] – [0028], Figure 2, and Abstract), introducing water to an electrolysis cell (Supported at least in Paragraphs [0006] and [0030]), producing hydrogen (Supported at least in Paragraphs [0006] and [0030]), separating hydrogen from water in the hydrogen/water separator (Supported at least in Paragraphs [0006] and [0030]), introducing environmental gas disposed around electrochemical system components to the hydrogen gas detector (Supported at least in Paragraphs [0006] and [0030]), and determining the hydrogen concentration in the environmental gas (Supported at least in Paragraphs [0006] and [0029]). Calibrating the hydrogen gas detector comprises: passing a hydrogen-free gas through a first conduit to the hydrogen detector, wherein the hydrogen gas detector generates a first signal (Supported at least in Paragraphs [0005], [0018], and [0025], Abstract, and Figure 2), flowing a mixture comprising a known quantity of hydrogen gas from a hydrogen/water separator through a second conduit to the hydrogen gas detector, wherein the hydrogen gas detector generates a second signal corresponding to a percentage of the hydrogen gas in the mixture (Supported at least in Paragraphs [0005], [0019], [0026] – [0028], Abstract, and Figure 2), and calibrating the hydrogen gas detector based upon the first and second signals (Supported at least in Paragraphs [0005], [0026] – [0028], and Abstract).

Claim 21 is directed to a process for operating an electrochemical system. This process comprises: calibrating a hydrogen gas detector (Supported at least in Paragraphs [0005], [0018], and [0025] – [0028], Abstract, and Figure 2), introducing water to an electrolysis cell (Supported at least in Paragraphs [0006] and [0030]), producing hydrogen (Supported at least in Paragraphs [0006] and [0030]), separating hydrogen from water in the hydrogen/water separator (Supported at least in Paragraphs [0006] and [0030]), introducing environmental gas disposed around electrochemical system components to the hydrogen gas detector (Supported at least in Paragraphs [0006] and [0030]), and determining the hydrogen concentration in the environmental gas (Supported at least in Paragraphs [0006] and [0029]). Calibrating the hydrogen gas detector comprises: passing a hydrogen-free gas to the hydrogen detector, wherein the hydrogen gas detector generates a first signal (Supported at least in Paragraphs [0005], [0018], and [0025], Abstract, and Figure 2), flowing a known quantity of hydrogen gas to the hydrogen gas detector, wherein the hydrogen gas detector generates a second signal corresponding to a percentage of the hydrogen gas in the mixture (Supported at least in Paragraphs [0005], [0019], and [0026] – [0028], Abstract, and Figure 2), and calibrating the hydrogen gas detector based upon the first and second signals (Supported at least in Paragraphs [0005], [0026] – [0028], and Abstract).

Claims 30 – 32, dependent claims, are directed to automatically calibrating the detector (Claim 30), and periodically, automatically calibrating the detector while the electrochemical system is operating (Claims 31 and 32). (Supported at least in Paragraphs [0007], [0028], [0029], and [0031])

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Claims 11 – 16 and 21 – 32 stand rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over U.S. Patent No. 6,036,827 to Andrews et al., in view of Japanese Patent No. JP 401066537 A to Ono et al., as evidenced by U.S. Patent No. 6,006,582 to Bhandari et al.

VII. ARGUMENT

Claims 11 – 16 and 21 – 32 are non-obvious over Andrews et al., in view of Ono et al., and even as evidenced by Bhandari et al.

The present application claims, in Claim 11, a process for operating an electrochemical system. The process comprises calibrating a hydrogen gas detector, introducing water to an electrolysis cell, producing hydrogen, separating hydrogen from water in the hydrogen/water separator, introducing environmental gas disposed around electrochemical system components to the hydrogen gas detector, and determining the hydrogen concentration in the environmental gas. Calibrating the hydrogen detector comprises passing a hydrogen-free gas (e.g., through a first conduit) to the hydrogen detector wherein the hydrogen gas detector generates a first signal, flowing a mixture comprising a known quantity of hydrogen gas (e.g., from a hydrogen/water separator through a second conduit) to the hydrogen gas detector wherein the hydrogen gas detector generates a second signal corresponding to a percentage of the hydrogen gas in the mixture, and calibrating the hydrogen gas detector based upon the first and second signals.

Andrews et al. are directed to a method for chemically heating a catalyst bed by feeding hydrogen to the catalyst. (Abstract) They use an electrolysis cell in a vehicle. As part of the vehicle system, Andrews et al. mention that a hydrogen detector can be placed *near* the hydrogen delivery system. (Col. 21, lines 27 – 29) They mention using the detector to detect hydrogen in the environment but do not even acknowledge a need to calibrate the detector.

Ono et al. are directed to an apparatus for analyzing hydrogen. Ono et al. disclose a measuring cell 9 that comprises the hydrogen detector 10.

> A sample gas is injected into a constant amount sample gas metering device 7 from a sample gas injector 5 and sent to a measuring cell 9 by a carrier gas from an air pump 1. A reference hydrogen gas is introduced into the cell 9 through a reference hydrogen gas metering device 8 to determine a correlationship between the concentration of hydrogen and an output signal of a hydrogen gas detector 10 beforehand. Then the sample gas carried on the carrier gas flows into and passes through the cell 9… Then, the concentration of hydrogen is calculated by a calibration curve formula with an output signal of the detector 10 previously stored in data processor 14 and shown on a results of analysis display device 15…

(Ono et al., Constitution)

Bhandari et al. are directed to a hydrogen sensor using a rare earth thin film detection element that addresses the issue of the sensor being susceptible to the incursion or generation of hydrogen. (Abstract) They state that

> No heating element, explosion-proof housing or calibration are required for the hydrogen sensor device of the present invention, as have been necessary features in prior art systems. The lack of a need for such expensive heating, containment, and calibration apparatus significantly decreases the price, size and weight of the hydrogen sensor of the present invention.

(Col. 21, lines 36 – 42)

For an obviousness rejection to be proper, the Examiner must meet the burden of establishing prima facie case of obviousness; namely that all elements of the invention are disclosed in the prior art; that the prior art relied upon, coupled with knowledge generally available in the art at the time of the invention, must contain some suggestion or incentive that would have motivated the skilled artisan to modify a reference or combined references; and that the proposed modification of the prior art must have had a reasonable expectation of success, determined from the vantage point of the skilled artisan at the time the invention was make. In re Fine, 5 U.S.P.Q.2d 1596, 1598 (Fed. Cir. 1988); Amgen v. Chugai Pharmaceuticals Co., 927 U.S.P.Q.2d, 1016, 1023 (Fed. Cir. 1996).

As is set forth in the Final Office Action dated May 18, 2006 (hereinafter "FOA 05/06"), Andrews et al. are relied upon to teach the concept of using a hydrogen detector in conjunction with an electrolyzer even though they fail to even acknowledge the issue of calibration. (Page 2)

> The Examiner concedes that Andrews et al. fail to disclose
>
> calibrating a hydrogen gas detector by passing a hydrogen-free gas through a first conduit to the hydrogen detector, wherein the hydrogen gas detector generates a first signal; flowing a known quantity of hydrogen gas from a hydrogen/water separator through a second conduit to the hydrogen gas detector, wherein the hydrogen gas detector generates a second signal corresponding to a percentage of the hydrogen gas in the mixture; and calibrating the hydrogen gas detector based on the first and second signals.

(FOA 05/06, page 3) In other words, Andrews et al. fail to disclose the present invention, and especially the entire portion of the claims directed to calibration of the sensor. As a result, the Examiner relies upon Ono et al. to allegedly disclose "a method of detecting hydrogen gas in a detector including the step of calibrating a hydrogen gas detector…" (FOA 05/06, page 3).

It is first noted that Ono et al. fail to disclose the specific calibration processes as disclosed by Appellants, e.g., passing a hydrogen-free gas to the hydrogen detector, wherein the hydrogen gas detector generates a first signal; flowing a known quantity of hydrogen gas to the hydrogen gas detector, wherein the hydrogen gas detector generates a second signal corresponding to a percentage of the hydrogen gas in the mixture; and calibrating the hydrogen gas detector based upon the first and second signals. (Claims 11 and 28)

Ono et al. specifically disclose that "a reference hydrogen gas is introduced into the [measuring] cell 9 through a reference hydrogen gas metering device 8 to determine a correlationship between the concentration of hydrogen and an output signal of a hydrogen gas detector 10 beforehand." (Constitution) As such, Ono et al. fail to teach calibrating a hydrogen detector by passing a hydrogen-free gas through a first conduit to the hydrogen detector and instead merely teach calculating the concentration of hydrogen with a calibration curve formula which correlates the concentration of hydrogen as determined by a gas metering device 8 and the output signal of the hydrogen detector. (Constitution) In other words, Ono et al. teach a method to determine how the magnitude of the signal produced on a detector is related to the quantity of hydrogen present using only a hydrogen enriched gas and as such, fail to teach the calibration method as claimed by Appellants.

The Examiner contends that

> [i]t would be obvious to one of ordinary skill in the art at the time the invention was made to calibrate a detector using known concentration standards in order to determine that a signal produced by the detector is accurate for the known standard.

(FOA 05/06, page 4) Appellants note that obviousness is not based upon what an artisan *could do* or what an artisan *may try*, but is based upon what an artisan would be motivated to do with an expectation of success. "Rejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness." *In re Kahn*, No. 04-1616 (CAFC March 22, 2006) citing In re Lee, 277 F.3d 1338, 1343-46 (Fed. Cir. 2002); and *In re Rouffett*, 149 F.3d 1350, 1355-59 (Fed. Cir. 1998). "When the [Examiner] does not explain the motivation, or the suggestion or teaching, that would have led the skilled artisan at the time of

the invention to the claimed combination as a whole, [it is] infer[ed] that the [Examiner] used hindsight to conclude that the invention was obvious." *Id.*

Here, the Examiner relies on a merely conclusory statement, e.g., "[i]t would be obvious…to calibrate a detector…in order to determine that a signal produced by the detector is accurate for the known standard". However, Appellants have not claimed to invent the concept of calibration. Actually they discuss in the background of their application that manual calibration was difficult and had other issues. What Appellants claim is a process for operating an electrolysis system that includes a particular calibration process. None of the references of record disclose the claimed process, even combined as suggested in FOA 05/06. FOA 05/06 has found a referenced that has both an electrochemical cell and a hydrogen detector, found another reference that discusses how the second reference uses their hydrogen detector, and then concluded that the present process would be obvious, even though there is no motivation to combine, no motivation to redesign the system of Andrews et al., and no expectation of success, and even though the combination fails to disclose all of the elements of the present process.

It is noted that, Andrews et al. are directed to a method and apparatus for chemically heating a catalyst bed, e.g., to promptly bring the catalyst bed to light-off temperatures. The system uses an electrolyzer to produce hydrogen for introduction to the catalyst bed. (Col. 7, lines 33 – 43) They teach the use of a "hydrogen detector 337… ***placed near*** the delivery system 10…". (Col. 21, lines 27 – 31; ***emphasis*** added) There is no teaching or suggestion in these sections of Andrews et al. cited in the FOA 05/06 that the hydrogen detector is calibrated, or that it is in fluid communication with any portion of the system (e.g., designed so that a known quantity of hydrogen gas can flow from the hydrogen/water separator to the hydrogen gas detector as is claimed in Claim 11 of the present application). Andrews et al. only disclose electrical communication of the hydrogen detector with the system. They actually mention that leaked hydrogen may pass out of the system in the exhaust gas and that "the hydrogen detector… will not help in this case because it is not positioned to detect hydrogen coming out in the exhaust". (Andrews et al., Col. 28, lines 17 – 21) Since Andrews et al. do not mention calibration, and since their system is for a vehicle, it seems logical that either they do not calibrate the detector (e.g., purchased and placed in the vehicle), or, at best manual calibration (e.g., spray gas into the detector for calibration) can be used, e.g., during a tune-up of the vehicle. To otherwise calibrate the detector of Andrews et al. would seemingly require physical

redesigning of the hydrogen system of Andrews et al. No motivation has been provided for such redesign.

However, Ono et al. are relied upon in FOA 05/06 to allegedly disclose the calibration. However, as discussed above, Ono et al. fail to disclose the method claimed by Appellants. Hence, even if Andrews et al. are combined with Ono et al., the combination fails to render the present claims obvious. Appellants specifically teach "calibrating the hydrogen gas detector" (Claim 11) by determining a hydrogen free signal and a signal of hydrogen gas of known concentration. Appellants specifically teach "calibrating the hydrogen gas detector based upon the first and second signals". (Claims 11 and 21) Ono et al. do not teach the presently claimed method but teach using a calibration curve formula using a previously stored output signal to determine a concentration of hydrogen. (Constitution)

Therefore Andrews et al., even if combined with Ono et al., fail to disclose all of these elements of Appellants' claims. The Examiner further contends that

> [i]ntroducing a hydrogen-free gas provides a low-end signal value for calibration. Using air as the hydrogen free gas would be obvious to a skilled artisan as the baseline value as hydrogen is generally not a component of air.

(FOA 05/06, page 4) However, the Examiner's suggestion, i.e. using a hydrogen-free gas as the "reference *hydrogen* gas" in the process disclosed by Ono et al., would seemingly defeat the intended function of the gas as disclosed by Ono et al. Ono et al. discloses a reference hydrogen gas "to determine the correlationship between the concentration of hydrogen and an output signal of a hydrogen gas detector..." (Constitution) By substituting a hydrogen-free gas, as suggested by the Examiner, it is believed that the intended function would be defeated because a hydrogen-free gas would produce an extremely small signal (or no signal) in a hydrogen detector and therefore could not be used to determine the "correlationship" between the hydrogen concentration and the magnitude of the output signal of the detector. In other words, how would "no signal" enable the determination of a correlationship between the concentration of hydrogen and the signal of the hydrogen detector? In this regard, the courts have held that "[i]f the proposed modification would render the prior art invention being modified unsatisfactorily for its intended purpose, then there is no suggestion or motivation to make the proposed modification. *In re Gordon* 733 F. 2d 900, 221 USPQ 1125 (Fed. Cir. 1984). There is no teaching or suggestion to use a hydrogen-free gas as the reference gas. Furthermore, as discussed above, it

would require a redesign of the disclosed method because the reference gas metering device 8 is in communication with a hydrogen source 6. (Fig. 3)

The Examiner further relies upon Bhandari et al. to allegedly support that "hydrogen sensors used for detecting hydrogen concentrations in devices… require calibration…" (FOA 05/06, page 4). However, the portion of Bhandari et al., which is picked carefully out of the background section, fails to disclose the calibration method as claimed by Appellants. (Col. 2, lines 3-15) Specifically, it merely discloses obtaining "the baseline resistance (or conductivity) of the MOS sensor in 'clean air'… by calibration". (Col. 2, lines 3-5) This section discloses establishing the baseline resistance so as to detect a decrease in resistance of the MOS material when certain toxins come in contact with the sensor. (Col. 2, lines 3-10) This section fails to teach the actual method by which to calibrate the MOS detector to obtain the baseline resistance. The mere fact that a baseline resistance in "clean air" is first established does not motivate an artisan to calibrate the hydrogen detector of Andrews et al. as disclosed by Appellants, to redesign system of Andrews et al. to locate and operate the detector as presently claimed, or to pick and choose elements of Ono et al. to modify Andrews et al. A skilled artisan would have no motivation to combine the process of obtaining "the baseline resistance (or conductivity) of the MOS sensor in 'clean air'… by calibration" with the un-calibrated detector of Andrews et al. Furthermore, even combined, as discussed above, the Appellants' claims are not obtained.

Furthermore, regardless of the discussion of this minor portion of Bhandari et al., a reference must be read as a whole, not by picking and choosing specific language, but for what it would disclose to one of ordinary skill in the art. Bhandari et al. disclose that the MOS sensors have "operational deficiencies… [i.e.] [t]hey require frequent calibrations (e.g., approximately every 3 months for current commercially available models)" and do not disclose a method (e.g., the method claimed by Appellants) to resolve this limitation. It is noted that Appellants designed their process to resolve limitations such as frequent manual calibrations. Instead, Bhandari et al. disclose a sensor requires *no calibration*. (Col. 21, lines 36 – 42) Considering that Bhandari et al. disclose a sensor requiring no calibration and Andrews et al. use a sensor in a vehicle and do not even acknowledge that calibration is a concern, wouldn't an artisan be motivated to use the sensor of Bhandari et al. in the system of Andrews et al., instead of redesigning the system of Andrews et al. to enable the flows and measurements identified in Ono et al.? There is no motivation to design Andrews et al. to have a calibration process as disclosed in the present

claims and there is no expectation of success for modifying Andrews et al. to include a process from Ono et al., especially in view of Bhandari et al. teaching that a sensor without calibration can be used.

There is no motivation to combine, or suggestion of how to combine the calibration of the baseline resistance as referenced by Bhandari et al. in the background as a problem with prior art sensors, with the method of Ono et al. (which utilizes a reference hydrogen gas to generate an output signal) or with the seemingly un-calibrated detector of Andrews et al. At best, Bhandari et al., when read as a whole, teach the use of their sensor that does not require calibration.

It is further noted that, even with the alleged combinations of Bhandari et al. and Ono et al. as set forth in FOA 05/06, it is still admitted that the references fail to teach flowing a known quantity of hydrogen gas from a hydrogen/water separator through a second conduit to the hydrogen gas detector. (FOA 05/06, page 5) As a result, with no motivation besides the present application, the Examiner contends that

> One of ordinary skill in the art would recognize that a source of hydrogen gas is available from the hydrogen system taught in Andrews et al. where hydrogen is collected with a hydrogen/water separator and that the quantity of sample gas would be determined in the measuring device taught in the Ono system in order to provide a known quantity of hydrogen to calibrate the system as taught by Ono.

(FOA 05/06, page 5) Appellants maintain that the Examiner has used an improper standard in arriving at this rejection, based on improper hindsight, which fails to consider the totality of the cited references. More specifically the Examiner has used Appellants' disclosure to select portions of the cited references to allegedly arrive at Appellants' invention. In doing so, the Examiner has failed to consider the teachings of the references as a whole in contravention of section 103. As stated above, "[r]ejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness." *In re Kahn*. There is no motivation or expectation of success to use Ono et al. as a basis for redesigning the system of Andrews et al. as suggested in FOA 05/06.

Hence, for at least the reasons (i) that there is no motivation to redesign the system of Andrews et al. to enable a process that is not even disclosed in the allegedly motivating reference, Ono et al., (ii) that Andrews et al. are not concerned about calibration, and (iii) that Bhandari et al. disclose a sensor that does not need calibration; an artisan would not be motivated

by these references, with an expectation of success, to modify Andrews et al. as suggested in FOA 05/06. Additionally, even if an artisan modified Andrews et al. to include the process of Ono et al., the combination would still fail to render the process claimed in the present claims obvious.

Appellants further note that Claim 13, 25-27 and 31-32 depend on patentable claims, e.g., 11, 21, and as such are, by definition, allowable. Furthermore, Appellants respectfully disagree with the Examiner's contention that "Ono teaches [by] determining the correlationship of the first and second signals, and calibrating the hydrogen gas detector" for at least the reasons discussed above. (FOA 05/06, page 6)

While the Examiner contends in response to Appellants remarks to FOA 12/05, that "Ono teaches calibrating a hydrogen gas detector by passing an air pump sample gas through a first conduit to the hydrogen detector wherein the hydrogen gas detector measures a first value" (FOA 05/06, page 7), Appellants respectfully disagree. Ono et al. disclose "...the sample gas carried on the carrier gas flows into and passes through the cell 9" after "[a] reference hydrogen gas is introduced into the cell 9 through a reference hydrogen gas metering device 8 to determine a correlationship between the concentration of hydrogen and an output signal of a hydrogen gas detector 10 beforehand." As discussed above, Ono et al. do not disclose using a sample gas and a reference hydrogen gas to calibrate the hydrogen gas detector as alleged by the Examiner. Instead, Ono et al. disclose establishing a correlationship with a calibration curve and then calculating the hydrogen concentration of the sample gas by a calibration curve formula with an output signal of the detector previously stored in a data processor. (Constitution)
It is not relevant what artisans could do, but what an artisan would be motivated to do with an expectation of success. That is, it is not relevant if an artisan could calibrate the hydrogen detector of Andrews et al., or if the artisan could redesign the system of Andrews et al. to calibrate in the fashion taught in Ono et al., or if the artisan could redesign the system of Andrews et al. to access hydrogen gas for calibration from a different source and to calibrate in a different manner. What is relevant, is what an artisan *would be motivated* to do, with an *expectation of success*, from the teachings of Andrews et al. and Ono et al., as evidenced by Bhandari et al. Here, there is no motivation and no expectation of success to combine the references of record as suggested, and even combined as suggested, the references fail to render the present claims obvious.

Appellants further note the non-obvious contributions of the dependent claims. For example, Claims 30 – 32 are directed to automatically calibrating the detector (Claim 30), and periodically, automatically calibrating the detector while the electrochemical system is operating (Claims 31 and 32). The Examiner contends that "merely automating the calibration would be obvious..." (FOA, page 8). However, Appellants did not "merely automate", but provided a electrochemical cell system and process that enables the automation of the hydrogen detecting that was not previously available. Appellants solved a problem with the prior systems, enhancing accuracy and simplifying the system. Automation of the hydrogen detecting is not obvious from the prior art, and the specifically taught and claimed process is not obvious. The present claims add patentable distinction over the prior art of record.

No *prima facie* case of obviousness has been established. For the reasons cited above, Appellants respectfully submit that all of the claims are allowable and the application is in condition for allowance. Appellants respectfully request reversal of the outstanding rejections and allowance of this application.

In the event the Examiner has any queries regarding the submitted arguments, the undersigned respectfully requests the courtesy of a telephone conference to discuss any matters in need of attention.

If there are any additional charges with respect to this Appeal Brief, please charge them to Deposit Account No. 06-1130.

Respectfully submitted,

CANTOR COLBURN LLP

By: /Pamela J. Curbelo/
Pamela J. Curbelo
Registration No. 34,676

Date: October 9, 2006
Customer No. 23462
Telephone (860) 286-2929
Facsimile (860) 286-0115

VIII. CLAIMS APPENDIX

11. (Previously Presented) A process for operating an electrochemical system, comprising:

calibrating a hydrogen gas detector by

passing a hydrogen-free gas through a first conduit to the hydrogen detector, wherein the hydrogen gas detector generates a first signal;

flowing a mixture comprising a known quantity of hydrogen gas from a hydrogen/water separator through a second conduit to the hydrogen gas detector, wherein the hydrogen gas detector generates a second signal corresponding to a percentage of the hydrogen gas in the mixture; and

calibrating the hydrogen gas detector based upon the first and second signals;

introducing water to an electrolysis cell;

producing hydrogen;

separating hydrogen from water in the hydrogen/water separator;

introducing environmental gas disposed around electrochemical system components to the hydrogen gas detector; and

determining the hydrogen concentration in the environmental gas.

12. (Original) The process according to Claim 11, wherein the calibration of the hydrogen gas detector further comprises mixing the hydrogen gas with hydrogen-free gas prior to introduction to the hydrogen gas detector, and wherein the mixture of the hydrogen gas and the hydrogen-free gas has a known hydrogen concentration.

13. (Original) The process according to Claim 11, further comprising introducing hydrogen and oxygen to a fuel cell stack and generating electricity.

14. (Original) The process according to Claim 11, wherein calibrating the hydrogen gas detector further comprises generating additional signals, wherein each one of the additional signals corresponds to a different percentage of the hydrogen gas, and calibrating the hydrogen gas detector with the additional signals.

15. (Original) The process according to Claim 11, wherein the hydrogen gas and the hydrogen-free gas are at about ambient pressure.

16. (Original) The process according to Claim 11, purging the electrochemical system if the hydrogen gas concentration exceeds a selected amount.

21. (Previously Presented) A process for operating an electrochemical system, comprising:

calibrating a hydrogen gas detector by

passing a hydrogen-free gas to the hydrogen detector, wherein the hydrogen gas detector generates a first signal;

flowing a known quantity of hydrogen gas to the hydrogen gas detector, wherein the hydrogen gas detector generates a second signal corresponding to a percentage of the hydrogen gas in the mixture; and

calibrating the hydrogen gas detector based upon the first and second signals;

introducing water to an electrolysis cell;

producing hydrogen;

separating hydrogen from water in the hydrogen/water separator;

introducing environmental gas disposed around electrochemical system components to the hydrogen gas detector; and

determining the hydrogen concentration in the environmental gas.

22. (Previously Presented) The process according to Claim 21, wherein the calibration of the hydrogen gas detector further comprises mixing the hydrogen gas with hydrogen-free gas prior to introduction to the hydrogen gas detector, and wherein the mixture of the hydrogen gas and the hydrogen-free gas has a known hydrogen concentration.

23. (Previously Presented) The process according to Claim 21, further comprising introducing hydrogen and oxygen to a fuel cell stack and generating electricity.

24. (Previously Presented) The process according to Claim 21, wherein the hydrogen gas and the hydrogen-free gas are at about ambient pressure.

25. (Previously Presented) The process according to Claim 21, further comprising repeating the calibration of the hydrogen gas detector.

26. (Previously Presented) The process according to Claim 21, further comprising periodically repeating the calibrating of the hydrogen gas detector.

27. (Previously Presented) The process according to Claim 11, further comprising periodically repeating the calibrating of the hydrogen gas detector.

28. (Previously Presented) A process for operating an electrochemical system, comprising:

calibrating a hydrogen gas detector by

passing a hydrogen-free gas through a first conduit to the hydrogen detector, wherein the hydrogen gas detector generates a first signal;

flowing a known quantity of hydrogen gas from a hydrogen/water separator through a second conduit to the hydrogen gas detector, wherein the hydrogen gas detector generates a second signal corresponding to a percentage of the hydrogen gas in the mixture; and

calibrating the hydrogen gas detector based upon the first and second signals by mixing the hydrogen gas with hydrogen-free gas prior to introduction to the hydrogen gas detector, wherein the mixture of the hydrogen gas and the hydrogen-free gas has a known hydrogen concentration;

introducing water to an electrolysis cell;

producing hydrogen;

separating hydrogen from water in the hydrogen/water separator;

introducing environmental gas disposed around electrochemical system components to the hydrogen gas detector;

determining the hydrogen concentration in the environmental gas;

purging the electrochemical system if the hydrogen gas concentration exceeds a selected amount; and

introducing hydrogen and oxygen to a fuel cell stack and generating electricity.

29. (Previously Presented) A process for operating an electrochemical system, comprising:

calibrating a hydrogen gas detector by

passing air to the hydrogen detector, wherein the hydrogen gas detector generates a first signal;

flowing a known quantity of hydrogen gas from a hydrogen/water separator to the hydrogen gas detector, wherein the hydrogen gas detector generates a second signal corresponding to a percentage of the hydrogen gas in the mixture; and

calibrating the hydrogen gas detector based upon the first and second signals;

introducing water to an electrolysis cell;

producing hydrogen;

separating hydrogen from water in the hydrogen/water separator;

introducing environmental gas disposed around electrochemical system components to the hydrogen gas detector; and

determining the hydrogen concentration in the environmental gas.

30. (Previously Presented) The process according to Claim 11, wherein calibrating the hydrogen gas detector further comprises automatically calibrating the hydrogen gas detector.

31. (Previously Presented) The process according to Claim 21, further comprising periodically automatically repeating calibrating the hydrogen detector while the electrochemical system is operating.

32. (Previously Presented) The process according to Claim 11, further comprising periodically automatically repeating calibrating of the hydrogen gas detector while the elcctrochemical system is operating.

IX. EVIDENCE APPENDIX

There is no evidence submitted pursuant to 37 C.F.R. §1.130, 37 C.F.R. §1.131, or 37 C.F.R. §1.132 or any other evidence entered by the Examiner and relied upon by the Appellant in this appeal, known to the Appellants, Appellants' legal representatives, or assignee.

X. RELATED PROCEEDING APPENDIX

There are no other related appeals or interferences known to Appellants, Appellants' legal representatives, or assignee that will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.